NAME_____ ID_____

MATHEMATICS 251 MIDTERM Fall 2001

SHOW ALL WORK. Marks for each problem are to the left of the problem number.
NO CALCULATORS PLEASE.

[5] 1. Find $\lim_{x\to 2}\left(\dfrac{2x^2+x-10}{8-2x^2}\right)$. (Do not use l'Hôpital's Rule.)

[5] 2. Find $\lim_{x\to 0}\left(\dfrac{x^2}{\sin^2 4x}\right)$. (Do not use l'Hôpital's Rule.)

[5] 3. Find and simplify $\frac{d}{dx}(x^2\sqrt{2-x^2})$.

[5] 4. Find and simplify $f'(x)$ where $f(x) = \sec(\tan x) - \sec x \tan x$.

[5] 5. Find and simplify $\dfrac{d}{dx}\left(\dfrac{4-\cos 3x}{3x^2+\sec 4x}\right)$.

[5] 6. Find and simplify $\dfrac{d}{dx}\sqrt{1-x\sin 2x}$.

[5] 7. USE THE DEFINITION OF DERIVATIVE to find $\dfrac{d}{dx}\sqrt{x^2-7}$.

[5] 8. Show that the function $f(x) = \begin{cases} x^3 - 8x, & x < 2 \\ x^2 - 12, & x \geq 2 \end{cases}$ is continuous at $x = 2$.

[5] 9. Find the equation of the tangent line to the graph of $y = (2x - 1)^{-2}$ at the point where $x = 1$.

[5] 10. Find the derivative of $\csc x$. You may use formulas for the derivatives of any of the other five trigonometric functions.

[50]